M5283P

DUAL VCA IC FOR Hi-Fi ELECTRONIC VOLUME CONTROL

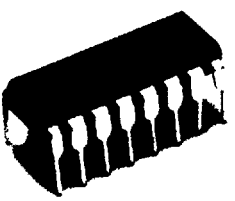
DESCRIPTION

The M5283P has 2 channels of built-in high-performance VCA designed to produce a wide dynamic range, low distortion ratio, and high S/N ratio.

The IC is an optimum device for Hi-Fi stereo sets, cassette tape recoders, Hi-Fi TV sets, VCR, and electronic musical instruments.

FEATURES

- Low distortion ..... THD = 0.003 % (V_O = 1Vrms)
- Independent control terminal
- 2 channels of VCA are built-in
  ch1 and ch2 can be controlled separately by Vc control
- Maximum input voltage is large ..... V_i = 7Vrms
  (when THD = 1 %)
- Large ATT range ..... 0 to − 90dB
- S/N (dynamic range) is large 85dB
  (V_i = 150mVrms • IHF-A filter)



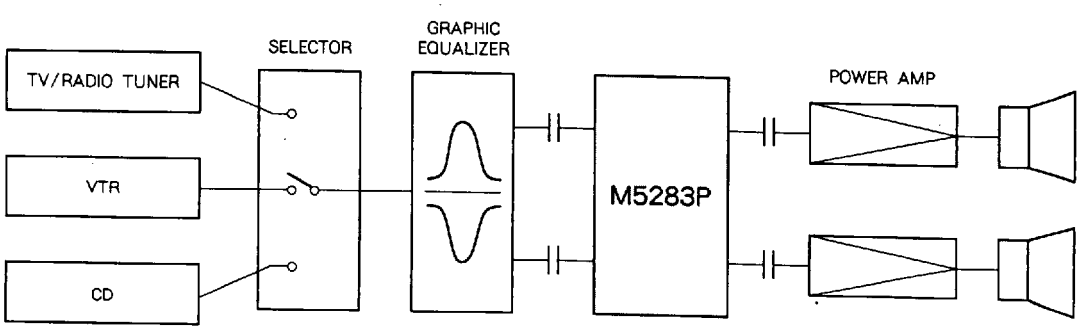
Outline 16P4

2.54mm pitch 300mil DIP
(6.3mm x 19.0mm x 3.3mm)

RECOMMENDED OPERATING CONDITION

Supply voltage range ..... V_{CC}, V_{EE} = ± 7 to ± 16V

SYSTEM CONFIGURATION



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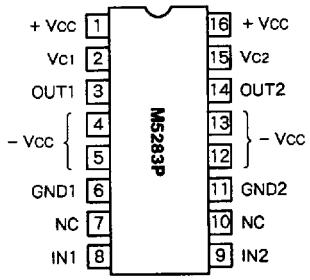
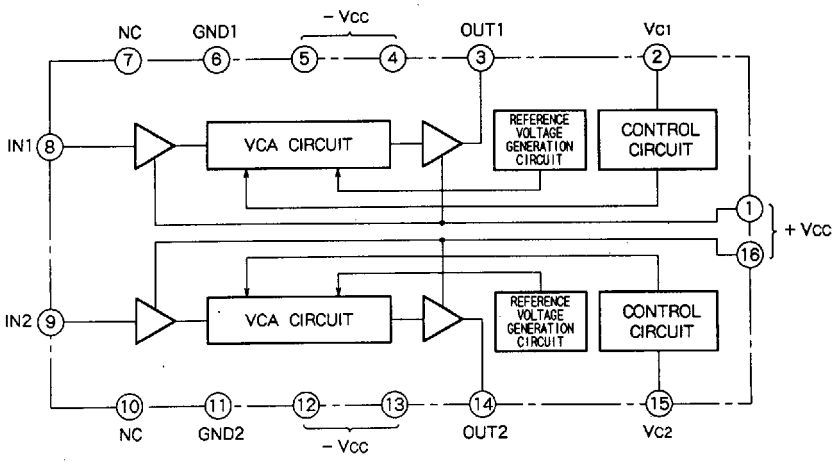
PIN CONFIGURATION (TOP VIEW)



Outline 16P4

NC : NO CONNECTION

IC INTERNAL BLOCK DIAGRAM



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PIN DESCRIPTION

Pin No.	Name	Symbol	Function
①	(+) power terminal on ch1 side	(+)Vcc	This is (+) supply voltage terminal on ch1 side. Connect to pin ⑯ externally.
②	ch1 control	Vc1	It controls signal on ch1 side. It controls signal by providing this terminal with voltage of 0 to 5V. Approximately 25nA (TYP) is necessary as bias current.
③	ch1 output	OUT1	This is an output terminal on ch1 side.
④	(−) power	(−)Vcc	pin ④, pin ⑤, pin ⑫ and pin ⑬ are connected internally. Add copper film for radiation at the foot of these pins for use.
⑤			
⑥	ch1 ground	GND1	This is a ground terminal on ch1 side. Connect to GND2 (pin ⑪) externally. Connect to GND wiring.
⑦	Not connected	NC	This terminal is kept OPEN.
⑧	ch1 input	IN1	This is an input terminal on ch1 side. Insert a resistor of approximately 47k to 100k Ω between GND and this input terminal (pin ⑧) for DC bias.
⑨	ch2 input	IN2	This is an input terminal on ch2 side. Insert a resistor of approximately 47k to 100k Ω between GND and this input terminal (pin ⑨) for DC bias.
⑩	Not connected	NC	This terminal is kept OPEN.
⑪	ch2 ground	GND2	This is a ground terminal on ch2 side. Connect to GND1 (pin ⑥) externally. Connect to GND wiring.
⑫	(−) power	(−)Vcc	pin ④, pin ⑤, pin ⑫ and pin ⑬ are connected internally. Add copper film for radiation at the foot of these pins for use.
⑬			
⑭	ch2 output	OUT2	This is an output terminal on ch2 side.
⑮	ch2 control	Vc2	It controls signal on ch2 side. It controls signal by providing this terminal with voltage of 0 to 5V. Approximately 25nA (TYP) is necessary as bias current.
⑯	(+) power terminal on ch2 side	(+)Vcc	This is (+) supply voltage terminal on ch2 side. Connect to pin ① externally.

ABSOLUTE MAXIMUM RATINGS (Ta = 25℃, unless otherwise noted)

Symbol	Parameter	Ratings	Unit
V_{CC}	Supply voltage	± 18	V
P_d	Power dissipation (Ta = 25℃)	2.0 (Note 1)	W
V_C	Control voltage	0 to V_{CC} − 1.5	V
T_{opr}	Operating temperature	−20 to + 75	℃
T_{stg}	Storage temperature	−40 to +125	℃

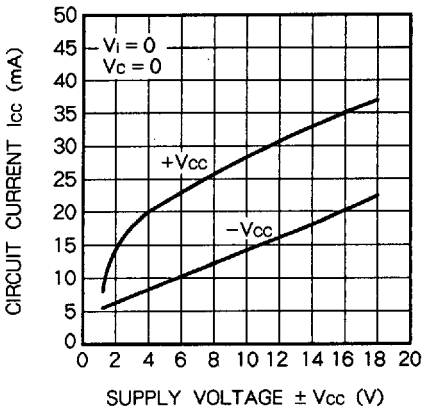
Note : Add copper film of 400mm²

ELECTRICAL CHARACTERISTICS (V_{CC} = ± 15V, V_C = 5V, Ta = 25℃, unless otherwise noted)

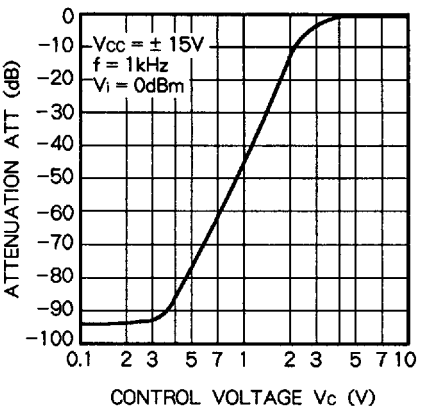
Symbol	Parameter	Test conditions	Limits			Unit
			Min	Typ	Max	
I_{CC}	Circuit current	V_i = 0	−	34	50	mA
V_{OM}	Maximum output voltage	V_C = 5V, THD = 1 %, f = 1kHz, R_L = 10k Ω	4	5	−	Vrms
V_{IM}	Maximum input voltage	V_C = 3V, THD = 1 %, f = 1kHz	6	7	−	Vrms
ATT	Attenuation error	V_C = 5V, V_i = 0dBm, f = 1kHz	− 2.3	− 0.3	+ 1.7	dB
Δ ATT	Attenuation deviation between channels	V_C = 5V, V_i = 0dBm, f = 1kHz	−	± 0.1	± 3.0	dB
ATT_M	Maximum attenuation	V_C = 0V, V_i = 0dBm, f = 1kHz	80	95	−	dB
THD	Total harmonic distortion	f = 1kHz, V_O = 1Vrms, V_C = 5V	−	0.003	0.05	%
CS	Channel separation	f = 1kHz, V_C = 5V, V_i = 0dBm	−	85	−	dB
V_{NO}	Output noise voltage	R_g = 0, V_C = 5V, IHF-A FILTER	−	6.5	30	μVrms
I_{VC}	Control bias current	V_i = 0, V_C = 5V	−	25	500	nA

TYPICAL CHARACTERISTICS

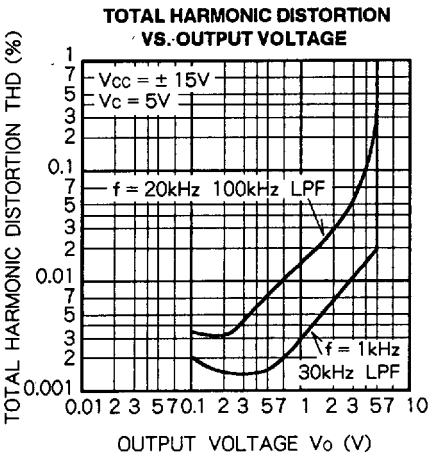
CIRCUIT CURRENT VS. SUPPLY VOLTAGE



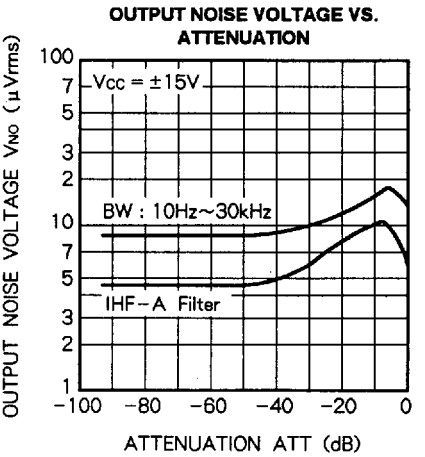
ATTENUATION VS. CONTROL VOLTAGE



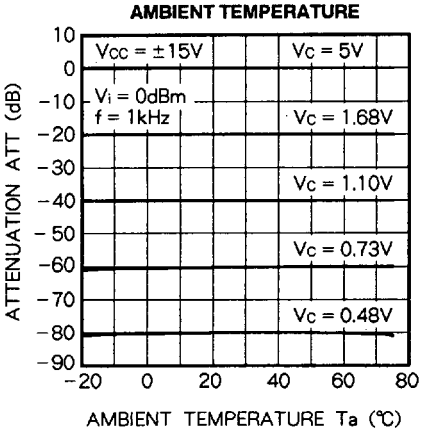
TOTAL HARMONIC DISTORTION VS. OUTPUT VOLTAGE



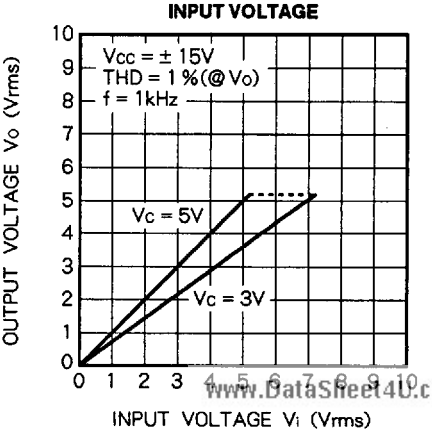
OUTPUT NOISE VOLTAGE VS. ATTENUATION



ATTENUATION VS. AMBIENT TEMPERATURE



OUTPUT VOLTAGE VS. INPUT VOLTAGE



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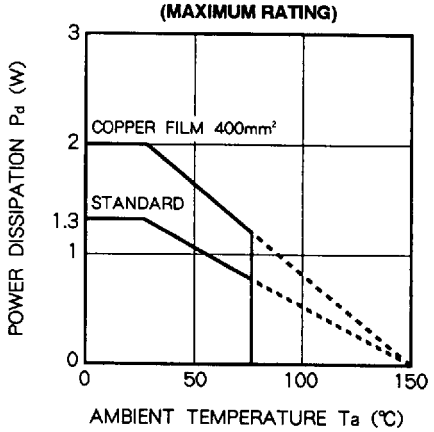
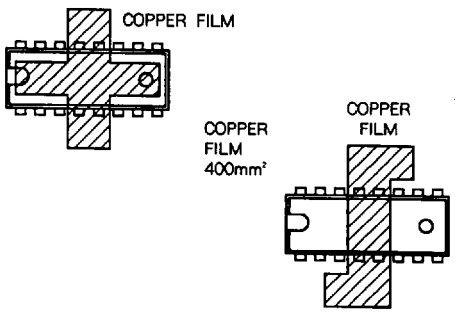
NOTES

(Note 1) **Radiation**

THERMAL DERATING (MAXIMUM RATING)



Example of layout of PC board



Circuit current for M5283P is large to improve various characteristics such as total harmonic distortion and noise voltage. (typ = 34mA). It consumes, therefore, large power and it is necessary to take thermal deration into consideration in layout of PC board. Add copper film as widely as possible at the foot of − Vcc terminal to improve radiation (thermal diffusion) of IC.

Power dissipation Pd becomes 1.3W when copper film cannot be added widely to improve radiation or when copper film for radiation cannot be applied. Calculate maximum power by ± Vcc × Iccmax and take ambient temperature and Vcc applied voltage into consideration for use within the above limit of Pd.

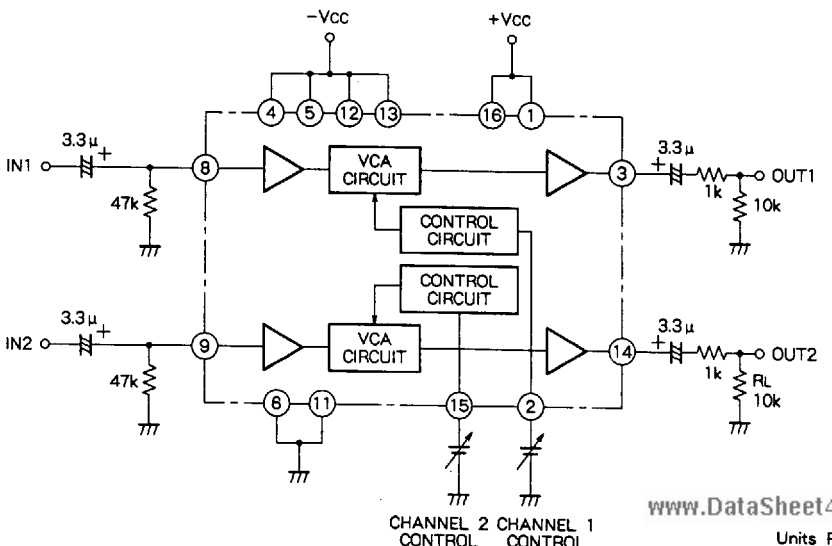
(Note 2) + Vcc terminal pin ①, pin ⑯, and GND terminal pin ⑥, pin ⑪ are not connected internally. Connect them externally before use.

(Note 3) Control terminal (pin ②, pin ⑮) sinks approximately 25nA (typ) of bias current.

(Note 4) M5283P becomes 0dB and one time amplifier when + 5V is applied to the control terminal (pin ②, pin ⑮). Signal attenuates by decreasing the voltage of control terminal.

(Note 5) Input signal is output to the output terminal with equal phase.

Example of application circuit



Units Resistance : Ω
Capacitance : F

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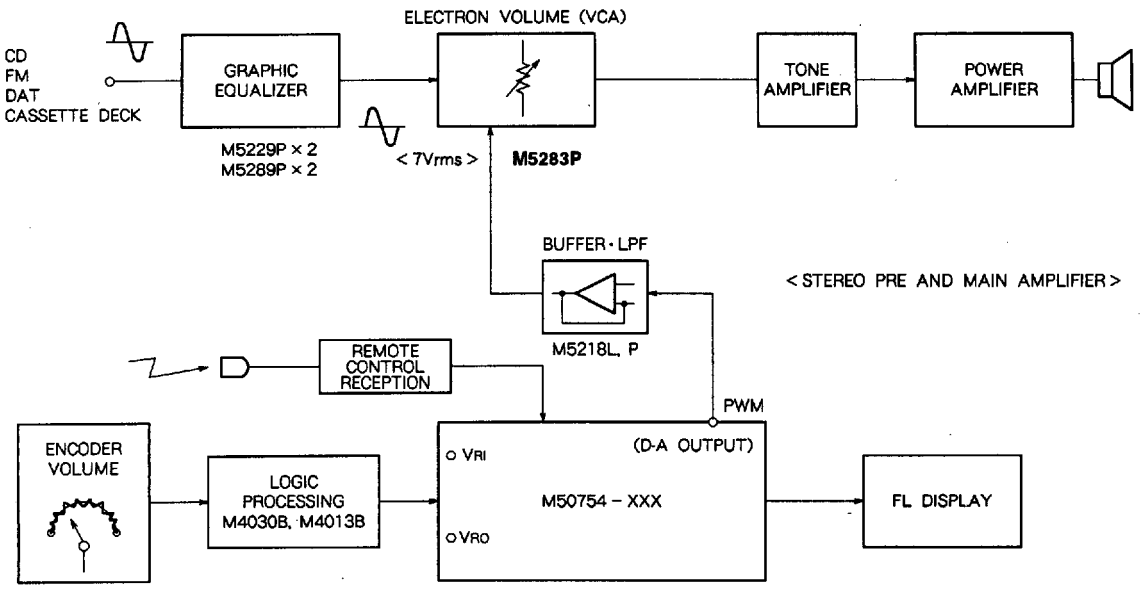
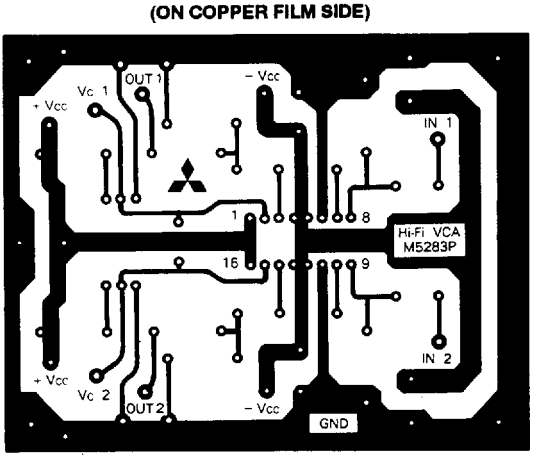
Application block diagram



PC BOARD FOR CIRCUIT EXPERIMENT

PC BOARD WIRING DIAGRAM
(ON COPPER FILM SIDE)



(ON THE SIDE OF PARTS INSERTION)